UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, ILLINOIS 60604

DATE: MAY 27 2016

SUBJECT: CLEAN AIR ACT INSPECTION REPORT
Arbor Hills Landfill, Northville, Michigan

FROM: Kenneth Ruffatto, Environmental Engineer
AECAB (IL/IN)

THRU: Nathan Frank, Section Chief
AECAB (IL/IN)

TO: File

BASIC INFORMATION

Facility Name: Arbor Hills Landfill

Facility Location: 10690 W. Six Mile Road, Northville, Michigan

Date of Inspection: May 3-5, 2016

Lead Inspector: Kenneth Ruffatto, Environmental Engineer

Other Attendees:

1. Sara Loiacono, USEPA, Environmental Scientist
2. Tom Flannagan, Advanced Disposal Services, General Manager
3. Christina Pearse-Bossick, Republic Services, Environmental Manager
4. Jennifer Baker, BEL, Director of Environmental Compliance
5. Jennifer Bowyer, Cornerstone Environmental Group
6. Tyler Schmidt, Cornerstone Environmental Group, Engineer
7. Craig Hicks, Fortistar Methane Group, Plant Manager
8. Carlos Wilson, Fortistar Methane Group, Area Manager
9. Steve Schroeck, Fortistar Methane Group, Wellfield Supervisor
10. Eric Hammerly, CB&I

Purpose of Inspection: Determine compliance with the Clean Air Act (CAA) and Municipal Solid Waste (MSW) Landfill NSPS and NESHAP

Facility Type: Municipal Solid Waste Landfill; Gas to Energy Facility

Regulations Central to Inspection: NSPS Subpart WWW, NESHAP Subpart AAAA

Arrival Time: 4:00PM May 3, 2016
Departure Time: 12:00PM May 5, 2016

Inspection Type:
☒ Unannounced Inspection
☐ Announced Inspection

OPENING CONFERENCE

☒ Credentials Presented
☒ CBI warning to facility provided

The following information was obtained verbally from Advanced Disposal Services, Republic Services, Fortistar Methane Group, and related consultants unless otherwise noted.

Process Description:
Arbor Hills Landfill is broken up into Arbor Hills East and Arbor Hills West Landfills. Arbor Hills West is an active landfill owned by Advanced Disposal Services. Arbor Hills East is a closed landfill owned by Republic Services. Republic Services owns the entire gas collection and control system at Arbor Hills Landfill. Fortistar Methane Group owns and operates the gas-to-energy plant on site and also is contracted to do the operation and maintenance work on the gas collection and control system. The landfill has over 300 gas collection wells and is going through multiple construction phases to add and redrill wells. Landfill gas is routed to a gas-to-energy plant that further pressurizes the gas in a compressor to approximately 280 psi. A refrigeration system is used to knock-out condensate before gas is sent to turbines, three of which are combined-cycle steam turbines using a boiler supply and one that is a simple-cycle solar turbine. The plant has a capacity of approximately 9,000 scfm and is currently operating at 7,300±100 scfm. The plant provides an average load of 16 megawatts. When the plant is either shutdown or not capable of processing the amount of gas going to it, gas can be routed to an enclosed and utility flare to be combusted. There are two John Zinc enclosed flares on site with a capacity of 2,600 scfm each, but according to Ms. Pearse, one of the flares was shut-down because Republic Services believes it would not pass a stack test. The utility flare has a capacity of 1,300 scfm with a total combined capacity between the enclosed and utility flare of 3,900 scfm.

Staff Interview: EPA spoke to Christina Pearse on May 4, 2016 around 9 AM. When asked about gas migration seen in Gas Probe 14 (GP-14) on Arbor Hills East, she told EPA that the probe has seasonal spikes of methane that will come and go. To mitigate the migration, Republic installed perimeter extraction wells on the East side prior to 2004. Leachate on Arbor Hills East is collected by gravity in a gravel drain; migration wells were put in the gravel pack approximately 3 years ago using horizontal perforated pipe. No additional work or studies were done to look into gas migration. Arbor Hills East also has a slurry wall along its east and

northeast side to maintain a proper water gradient to keep leachate in. The wall is made of a mixture of cement and clay.

Ms. Pearse is currently stationed at the landfill full time overlooking the extensive well expansion and maintenance on Arbor Hills West. Between February and March 2016, Republic and Fortistar installed 53 new wells (approximately 20 new wells and 23 redrills), which were considered Phase I and II of construction. After this well expansion, gas extraction at the landfill increased by approximately 25% to 7,300-7,500 scfm. Surface monitoring for methane is conducted daily at the landfill by a third-party technician, who monitors for a two hour period per day, covering portions of the landfill in rotation so that the entire landfill is monitored approximately every 6 days. Placement of new wells is determined based partially on results of this surface monitoring. Republic Services also looked at the health of existing wells and evaluated clogging to determine which needed to be redrilled. The redrilling of wells was done primarily due to pinched wells, which Ms. Pearse stated were potentially caused by the landfill filling sequence, and due to compromised wells from trucks running into them. The Phase III construction plan includes 20 wells: 4 new and 16 redrills. Republic has noticed that liquid levels in the wells are higher than expected due to the buildup of leachate. Out of the over 300 wells on-site, approximately 70 already have pumps for leachate and 20 more will have pumps after Phase III is complete.

According to Ms. Pearse, sometime between April 29th and May 9th, 2016, Well 253R in Arbor Hills West melted; it was discovered smoldering on the morning of May 9th. The wells surrounding it were shut down to ensure no oxygen was being pulled near the heated area, and Draeger tubes were used to take samples for carbon monoxide to ensure no fire was spreading.

Three removable ambient air monitors that can measure hydrogen sulfide and methane are installed at the landfill. Cornerstone Environmental Group is responsible for operating and maintaining the monitors. Tyler Schmidt of Cornerstone retrieved the data from the monitors and sent it to EPA for further review.

TOUR INFORMATION

EPA toured the facility: Yes

Data Collected and Observations:
On May 3, 2016, EPA measured for surface methane emissions on the east side of the landfill between the fenceline and Napier Road. EPA found multiple areas with elevated levels of methane outside the boundary and waste footprint. Photos are included in Appendix A with results in Appendix C. EPA also noticed strong odors near gas probe 14 and that all areas with elevated levels of methane had distressed vegetation. On May 5th, EPA observed bubbling occurring in standing water on the east side of Arbor Hills East (see Appendix B for videos).

On May 4, 2016, at the request of Republic Services, EPA conducted additional surface methane monitoring alongside Mr. Hammerly of CB&I. Monitoring by both parties was conducted in the same location between the fenceline and Napier Road and produced consistent results. EPA also drove around the landfill site and observed slight odors near the well that recently melted.

On May 5, 2016, EPA toured the site after a rainstorm and was unable to do monitoring due to the saturated soil. However, EPA noted bubbling coming through stagnant puddles in areas of distressed vegetation on the east side of Arbor Hills East. This bubbling was found at multiple locations and elevations. Several locations were situated above a French drain used for leachate and stormwater management; the other areas were scattered along an elevation approximately 20 ft higher.

Field Measurements: were taken during this inspection.

- Surface Emission Monitoring was done using a flame ionization detector (FID) outside of the landfill boundary for methane. Results are shown in Appendix C.

RECORDS REVIEW

- Ambient air monitor data
- Site map

CLOSING CONFERENCE

Requested documents:

Republic Services and Advanced Disposal

- Phase I and II construction reports
- Phase III construction plans
- 2nd response to DEQ enforcement action letter
- Monitoring data from ambient air monitors
- Arbor Hills East Slurry Wall Description

Fortistar

- Stack tests (5 years)
- Deviation reports (5 years)
- Vacuum and flare logs (since January 2016)
- Well logs (since January 2016)
- Gas sampling data

Compliance Assistance: EPA indicated that Surface Emission Monitoring (SEM) must be done at a slower pace in order to reach instrument response time and should include measurements at areas where visual observations (such as distressed vegetation) indicate elevation landfill gas concentrations.

Concerns: EPA noted the following concerns:

- elevated levels of methane at the surface outside of the boundary of the landfill
- distressed, including cracked and eroded, cover in multiple areas (typically around tie-ins between cells and in areas of Arbor Hills East)
- wells were not suitably marked to help truck drivers see them
- high liquid levels in wells affecting gas extraction capabilities

- lack of capacity at the flares to handle typical gas flow from the landfill

SIGNATURES

Lead Inspector: Kenneth Rupp* Date: 5/26/2016

Section Chief: [signature] Date: 6/27/16

APPENDICES AND ATTACHMENTS

- Appendix A: Media (Pictures)
- Appendix B: Media (Videos)
- Appendix C: Surface Monitoring Results (Methane)

Facility Name: Arbor Hills Landfill
Facility Location: 10690 W Six Mile Road, Northville, Michigan
Date of Inspection: May 3, 2016 to May 5, 2016

APPENDIX A: MEDIA (PHOTOS)

Photo No.	Date and Time	Description
IMG_0002	May 3, 2016 at 5:58PM	Area approximately 25' South of GP-14
IMG_0003	May 3, 2016 at 6:00PM	Area approximately 25' South of GP-14
IMG_0004	May 3, 2016 at 6:04PM	Distressed area south of GP-14
IMG_0005	May 3, 2016 at 6:04PM	Distressed area relative to Napier Road
IMG_0006	May 3, 2016 at 6:09PM	Overview of distressed area with corresponding distressed area on hill
IMG_0007	May 3, 2016 at 6:17PM	Distressed area approximately 70' North of Railroad crossing
IMG_0008	May 3, 2016 at 6:23PM	Meter showing a warning because of methane parts per million levels above 10,000 ppm near PW-01
IMG_0009	May 3, 2016 at 6:23PM	Taking measurements at and around PW-01
IMG_0010	May 3, 2016 at 6:28PM	Area of distressed vegetation
IMG_0011	May 3, 2016 at 6:31PM	Area of distressed vegetation near wells CD and CS
IMG_0012	May 3, 2016 at 6:33PM	Eroded and distressed vegetation near CD and CS
IMG_0013	May 5, 2016 at 10:16AM	Distressed vegetation on east side of Arbor Hills East landfill
IMG_0014	May 5, 2016 at 10:17AM	Distressed vegetation at Southeast side of landfill
IMG_0018	May 5, 2016 at 10:25AM	Erosion and distressed vegetation on east side
IMG_0019	May 5, 2016 at 10:27AM	Tracks and erosion on east side
IMG_0020	May 5, 2016 at 10:35AM	Distressed vegetation and eroded area near GP-14
IMG_0021	May 5, 2016 at 10:39AM	Distressed vegetation and eroded area near GP-14
IMG_0022	May 5, 2016 at 10:39AM	Extraction system in French drain
IMG_0025	May 5, 2016 at 10:58AM	New extraction wells being constructed between Cell 5A and Arbor Hills East landfill
IMG_0026	May 5, 2016 at 11:05AM	New dirt on south end of landfill
IMG_0027	May 5, 2016 at 11:05AM	Leachate left from leachate breakout in cover
IMG_0028	May 5, 2016 at 11:06AM	Area of distressed vegetation on south side
IMG_0029	May 5, 2016 at 11:06AM	Eroded stormwater crevice

APPENDIX B: MEDIA (VIDEOS)

Video No.	Date and Time	Description
MVI_0016	May 5, 2016 at 10:18AM	Bubbling through cover on southeast part of Arbor Hills East
MVI_0017	May 5, 2016 at 10:22AM	Bubbling through cover on southeast part of Arbor Hills East
MVI_0023	May 5, 2016 at 10:55AM	Bubbling through interim cover near utility flare on south end of landfill
MVI_0030	May 5, 2016 at 11:09AM	Slight bubbling in eroded stormwater crevice on south end of landfill

Facility Name: Arbor Hills Landfill
Facility Location: 10690 W Six Mile Road, Northville, Michigan
Date of Inspection: May 3, 2016

APPENDIX C: SURFACE MONITORING RESULTS (METHANE)

Results of EPA's methane surface monitoring are shown below.

May 3, 2016 Monitoring Results

EPA used a flame ionization detector on May 3, 2016 to measure surface methane concentrations between Napier Road and the landfill fenceline. Method 21 following guidance from NSPS Subpart WWW was used to perform the surface monitoring. All monitoring and calibration was done between 5:45 PM and 7:00 PM

The instrument was calibrated by Kenneth Ruffatto using calibration gases at 500, 2,000, and 10,000 ppm of methane. The following calibration data was collected for the 500 ppm calibration gas:

Trial	Meter Reading (ppm)	Difference from 500 ppm Calibration Gas (ppm)	Response Time (seconds to 90% Value)
1	499	1	3
2	499	1	3
3	498	2	3
Average		1.3	3

The calibration precision is 0.26% which is within the required 10% under Method 21. The average instrument response time is 3 seconds which is also within the required response time of 30 seconds.

The following calibration data was collected for the 2,000 ppm calibration gas:

Trial	Meter Reading (ppm)	Difference from 500 ppm Calibration Gas (ppm)	Response Time (seconds to 90% Value)
1	2015	15	5
2	1999	1	4
3	1998	2	4
Average		6	4.3

The calibration precision is 0.3% which is within the required 10% under Method 21. The average instrument response time is 4.3 seconds which is also within the required response time of 30 seconds.

The general weather on May 3, 2016 at Arbor Hills Landfill between 5:45 PM and 7:00 PM was 63°F and clear with no precipitation. The wind was from the WSW at 0-6 mph.

The background concentration of methane upwind of the site was -1.5 ppm and downwind of the site was -0.6 ppm with an average background of -1.1 ppm.

Monitoring was performed by Sara Loiacono. The following areas had concentrations of methane greater than 500 ppm. Note that only the highest concentration detected is recorded, but additional monitoring was done around these points that also showed levels greater than 500 ppm.

Location	Concentration of methane (ppm)
Area ~45-100' S of GP-14	6,078
Area around PW-01	>10,000
Area outside of fence near wells CD and CS	1,371

May 4, 2016 Monitoring Results

EPA used a flame ionization detector on May 4, 2016 to measure surface methane concentrations in the same areas as May 3, 2016. The monitoring was done side by side with CB&I who is responsible for doing surface emission monitoring for Republic Services. All readings and calibration were done between 11:30 AM and 12:30 PM on May 4, 2016.

The instrument was calibrated by Kenneth Ruffatto using calibration gases at 500, 2000, and 10,000 ppm of methane. The following calibration data was collected for the 500 ppm calibration gas:

Trial	Meter Reading (ppm)	Difference from 500 ppm Calibration Gas (ppm)	Response Time (seconds to 90% Value)
1	500	0	4
2	503	3	4
3	504	4	3
Average		2.3	3.6

The calibration precision is 0.46% which is within the required 10% under Method 21. The average instrument response time is 3.6 seconds which is also within the required response time of 30 seconds.

The following calibration data was collected for the 2,000 ppm calibration gas:

Trial	Meter Reading (ppm)	Difference from 500 ppm Calibration Gas (ppm)	Response Time (seconds to 90% Value)
1	2010	10	6
2	2013	13	3
3	2002	2	3
Average		8.3	4

The calibration precision is 0.41% which is within the required 10% under Method 21. The average instrument response time is 4 seconds which is also within the required response time of 30 seconds.

Only one calibration point was taken at 10,000 ppm calibration gas which gave a meter reading of 10,000 ppm and a response time of 6 seconds.

The general weather on May 4, 2016 at Arbor Hills Landfill between 11:30 AM and 12:30 PM was 56°F and overcast with a drizzle. The wind was from the SSE at 7-10 mph.

Monitoring was performed by Kenneth Ruffatto. The following areas had concentrations of methane greater than 500 ppm. Note that only the highest concentration detected is recorded, but additional monitoring was done around these points that also showed levels greater than 500 ppm.

Location	Concentration of methane (ppm)
Area ~45-100' S of GP-14	2,366

Due to increased intensity of rain, monitoring was stopped to ensure instrument integrity. CB&I confirmed that they were getting comparable readings to EPA.